




## Product Specification

AU OPTRONICS CORPORATION

( V ) Preliminary Specifications

( ) Final Specifications

|  |  |
|--|--|
| Module   | 14.1" WXGA+ Color TFT-LCD                        |
| Model Name   | B141PW04 V0 (HW 0A) DELL P/N: GX968              |
| Note (  ) | <b>LED Backlight with driving circuit design</b> |

Customer

Date

Checked &  
Approved by

Date

Note: This Specification is subject to change without notice.

Approved by

Date

Howard lee02/26/2008

Prepared by

Zephyr Hsu02/18/2008**NBBU Marketing Division /  
AU Optronics corporation**



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### Record of Revision

| Version and Date | Page | Old description            | New Description | Remark |
|------------------|------|----------------------------|-----------------|--------|
| 0.1 2007/01/04   | All  | First Edition for Customer |                 |        |
| 0.2 2008/02/26   | All  | Customer sample edition    |                 |        |
|                  |      |                            |                 |        |
|                  |      |                            |                 |        |
|                  |      |                            |                 |        |
|                  |      |                            |                 |        |
|                  |      |                            |                 |        |



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### 1. Handling Precautions

- 1) Since front polarizer is easily damaged, pay attention not to scratch it.
- 2) Be sure to turn off power supply when inserting or disconnecting from input connector.
- 3) Wipe off water drop immediately. Long contact with water may cause discoloration or spots.
- 4) When the panel surface is soiled, wipe it with absorbent cotton or other soft cloth.
- 5) Since the panel is made of glass, it may break or crack if dropped or bumped on hard surface.
- 6) Since CMOS LSI is used in this module, take care of static electricity and insure human earth when handling.
- 7) Do not open nor modify the Module Assembly.
- 8) Do not press the reflector sheet at the back of the module to any directions.
- 9) At the insertion or removal of the Signal Interface Connector, be sure not to rotate nor tilt the Interface Connector of the TFT Module.
- 11) After installation of the TFT Module into an enclosure (Notebook PC Bezel, for example), do not twist nor bend the TFT Module even momentarily. At designing the enclosure, it should be taken into consideration that no bending/twisting forces are applied to the TFT Module from outside. Otherwise the TFT Module may be damaged.
- 12) Small amount of materials having no flammability grade is used in the LCD module. The LCD module should be supplied by power complied with requirements of Limited Power Source (IEC60950 or UL1950), or be applied exemption.
- 13) Disconnecting power supply before handling LCD modules, it can prevent electric shock, DO NOT TOUCH the electrode parts, cables, connectors and LED circuit part of TFT module that a LED light bar build in as a light source of back light unit. It can prevent electrostatic breakdown.



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### 2. General Description

B141PW04 V0 is a Color Active Matrix Liquid Crystal Display composed of a TFT LCD panel, a driver circuit, and LED backlight system. The screen format is intended to support the WXGA+ (1440(H) x 900(V)) screen and 262k colors (RGB 6-bits data driver) with LED backlight driving circuit. All input signals are LVDS interface compatible.

B141PW04 V0 is designed for a display unit of notebook style personal computer and industrial machine.

#### 2.1 General Specification

The following items are characteristics summary on the table at 25 °C condition:

| Items  | Unit                 | Specifications   |       |       |     |
|--|----------------------|--|-------|-------|-----|
| Screen Diagonal  | [mm]                 | 357.7 (14.1W")   |       |       |     |
| Active Area  | [mm]                 | 303.48 (H) x 189.68 (V)  |       |       |     |
| Pixels H x V   |                      | 1440 x 3 (RGB) x 900   |       |       |     |
| Pixel Pitch  | [mm]                 | 0.2108 x 0.2108  |       |       |     |
| Pixel Format   |                      | R.G.B. Vertical Stripe   |       |       |     |
| Display Mode   |                      | Normally White   |       |       |     |
| White Luminance (ILED=20mA)<br>(Note: ILED is LED current) | [cd/m <sup>2</sup> ] | 300 typ. (5 points average)<br>255 min. (5 points average)       |       |       |     |
| Luminance Uniformity                                       |                      | 2.0 max. (5 points)  |       |       |     |
| Contrast Ratio   |                      | 400 min  |       |       |     |
| Response Time  | [ms]                 | 8 typ / 15 Max   |       |       |     |
| Nominal Input Voltage VDD                                  | [Volt]               | +3.3 typ.  |       |       |     |
| Power Consumption  | [Watt]               | 5.5 max. (Include Logic and Blu power, without LED efficiency) ) |       |       |     |
| Weight   | [Grams]              | 375 max.   |       |       |     |
| Physical Size  | [mm]                 |  | L     | W     | T   |
|  |                      | Max  | 320.0 | 207.0 | 5.5 |
|  |                      | Typical  | 319.5 | 206.5 | -   |
|  |                      | Min  | 319.0 | 206.0 | -   |
| Electrical Interface                                       |                      | 2 channel LVDS   |       |       |     |
| Surface Treatment  |                      | Anti-Glare, Hardness 3H,<br>Haze 25%                             |       |       |     |



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|                         |      |                           |
|-------------------------|------|---------------------------|
| Support Color           |      | 262K colors ( RGB 6-bit ) |
| Temperature Range       | [°C] | 0 to +50                  |
| Operating               | [°C] | -20 to +65                |
| Storage (Non-Operating) |      |                           |
| RoHS Compliance         |      | RoHS Compliance           |

## 2.2 Optical Characteristics

The optical characteristics are measured under stable conditions at 25°C (Room Temperature) :

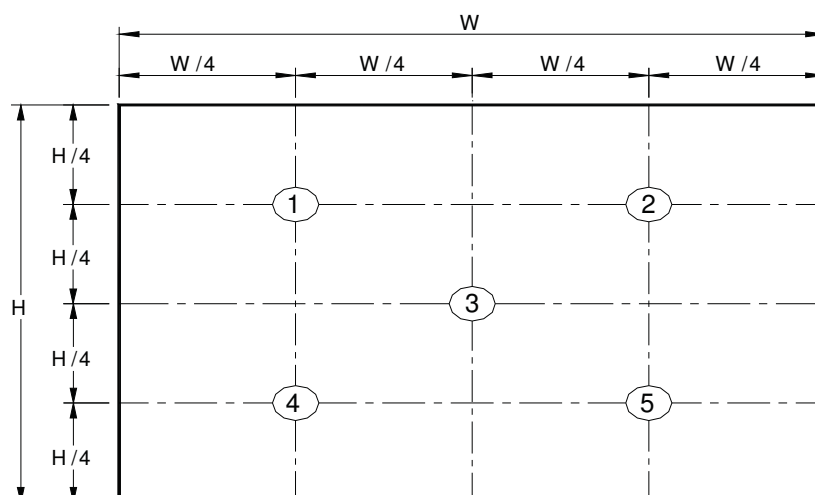
| Item  | Unit                 | Conditions         | Min.  | Typ.  | Max.  | Note     |
|---|----------------------|--------------------|-------|-------|-------|----------|
| White Luminance<br>(ILED=20mA)                  | [cd/m <sup>2</sup> ] | 5 points average   | 255   | 300   | -     | 1, 4, 5. |
| Viewing Angle                                   | [degree]             | Horizontal (Right) | -     | 40    | -     | 4, 9     |
|   | [degree]             | CR = 10 (Left)     | -     | 40    | -     |          |
|   | [degree]             | Vertical (Upper)   | -     | 15    | -     |          |
|   | [degree]             | CR = 10 (Lower)    | -     | 30    | -     |          |
| Luminance Uniformity                            |                      | 5 Points           | -     | -     | 2.0   | 1, 3, 4  |
| Luminance Uniformity                            |                      | 13 Points          | -     | -     | 2.86  | 2, 3, 4  |
| CR: Contrast Ratio                              |                      |                    | 400   | -     | -     | 4, 6     |
| Cross talk                                      | %                    |                    |       |       | 4     | 4, 7     |
| Response Time                                   | [msec]               | Rising             | -     | -     | -     | 4, 8     |
|   | [msec]               | Falling            | -     | -     | -     |          |
|   | [msec]               | Rising + Falling   | -     | 8     | 15    |          |
| Chromaticity of color Coordinates<br>(CIE 1931) |                      | Red x              | 0.550 | 0.580 | 0.610 | 4, 9     |
|   |                      | Red y              | 0.310 | 0.340 | 0.370 |          |
|   |                      | Green x            | 0.280 | 0.310 | 0.340 |          |
|   |                      | Green y            | 0.520 | 0.550 | 0.580 |          |
|   |                      | Blue x             | 0.125 | 0.155 | 0.185 |          |
|   |                      | Blue y             | 0.125 | 0.155 | 0.185 |          |
|   |                      | White x            | 0.283 | 0.313 | 0.343 |          |
|   |                      | White y            | 0.299 | 0.329 | 0.359 |          |



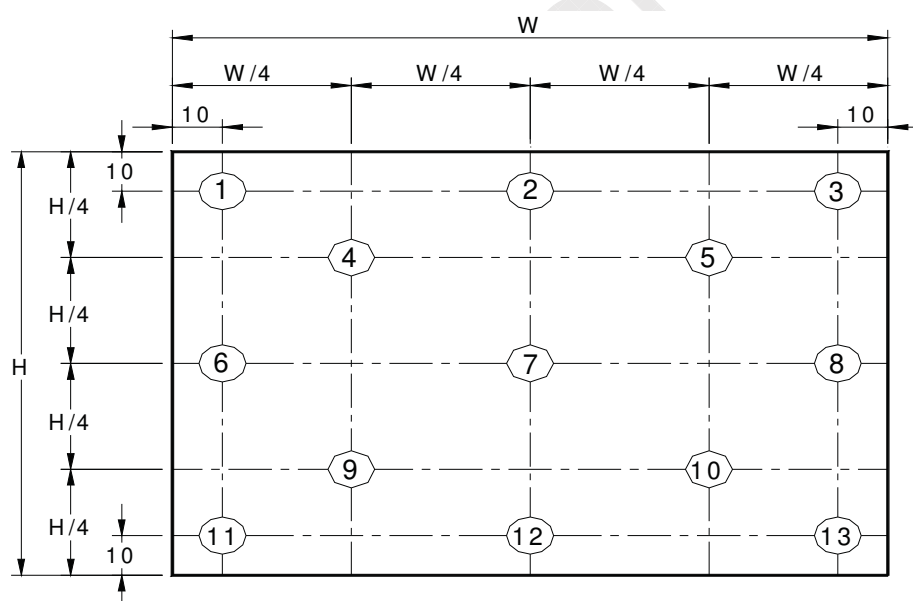
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**Note 1:** 5 points position (Ref: Active area)



**Note 2:** 13 points position (Ref: Active area)



**Note 3:** The luminance uniformity of 5 or 13 points is defined by dividing the maximum luminance values by the minimum test point luminance

$$\delta_{W5} = \frac{\text{Maximum Brightness of five points}}{\text{Minimum Brightness of five points}}$$

$$\delta_{W13} = \frac{\text{Maximum Brightness of thirteen points}}{\text{Minimum Brightness of thirteen points}}$$

**Note 4:** Measurement method

The LCD module should be stabilized at given temperature for 30 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting

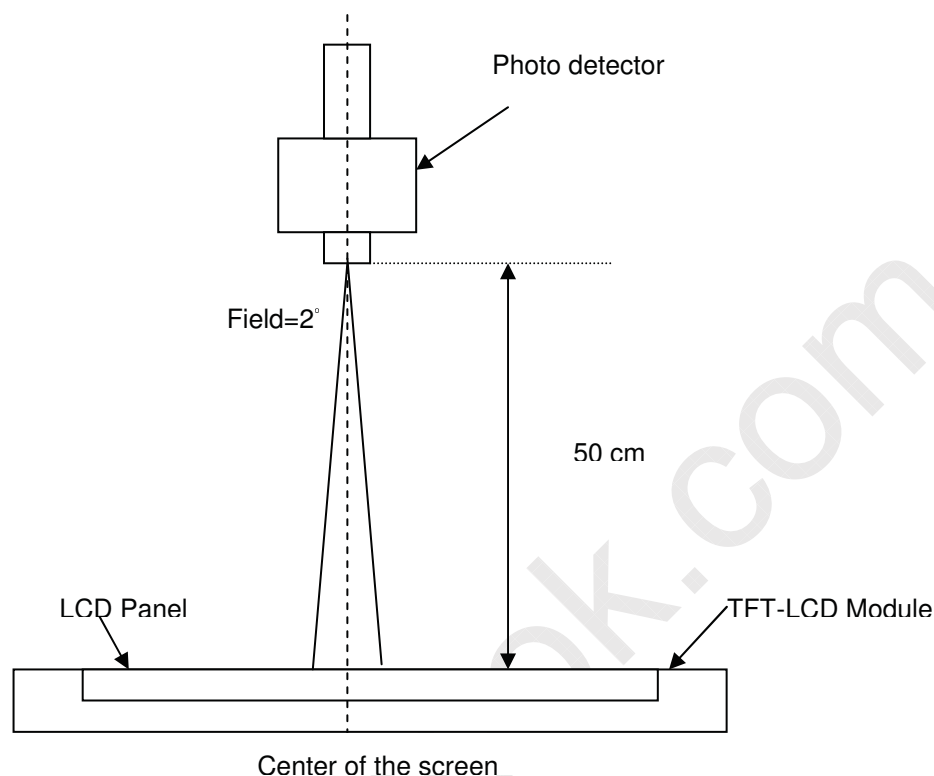




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Backlight for 30 minutes in a stable, windless and dark room.



**Note 5 :** Definition of Average Luminance of White ( $Y_L$ ):

Measure the luminance of gray level 63 at 5 points ,  $Y_L = [L(1) + L(2) + L(3) + L(4) + L(5)] / 5$

$L(x)$  is corresponding to the luminance of the point X at Figure in Note (1).

**Note 6 :** Definition of contrast ratio:

Contrast ratio is calculated with the following formula.

$$\text{Contrast ratio (CR)} = \frac{\text{Brightness on the "White" state}}{\text{Brightness on the "Black" state}}$$

**Note 7 :** Definition of Cross Talk (CT)

$$CT = |Y_B - Y_A| / Y_A \times 100 (\%)$$

Where

$Y_A$  = Luminance of measured location without gray level 0 pattern (cd/m<sup>2</sup>)

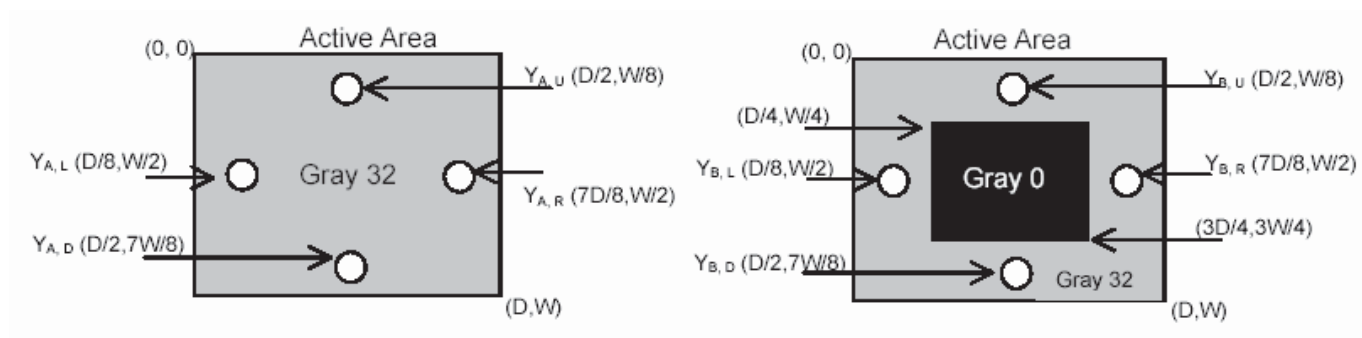
$Y_B$  = Luminance of measured location with gray level 0 pattern (cd/m<sup>2</sup>)





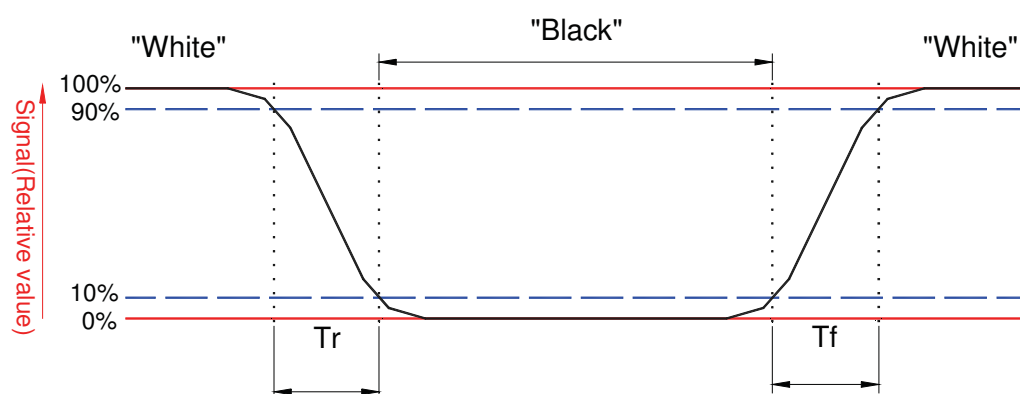
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**Note 8:** Definition of response time:

The output signals of BM-7 or equivalent are measured when the input signals are changed from "Black" to "White" (falling time) and from "White" to "Black" (rising time), respectively. The response time interval between the 10% and 90% of amplitudes. Refer to figure as below.



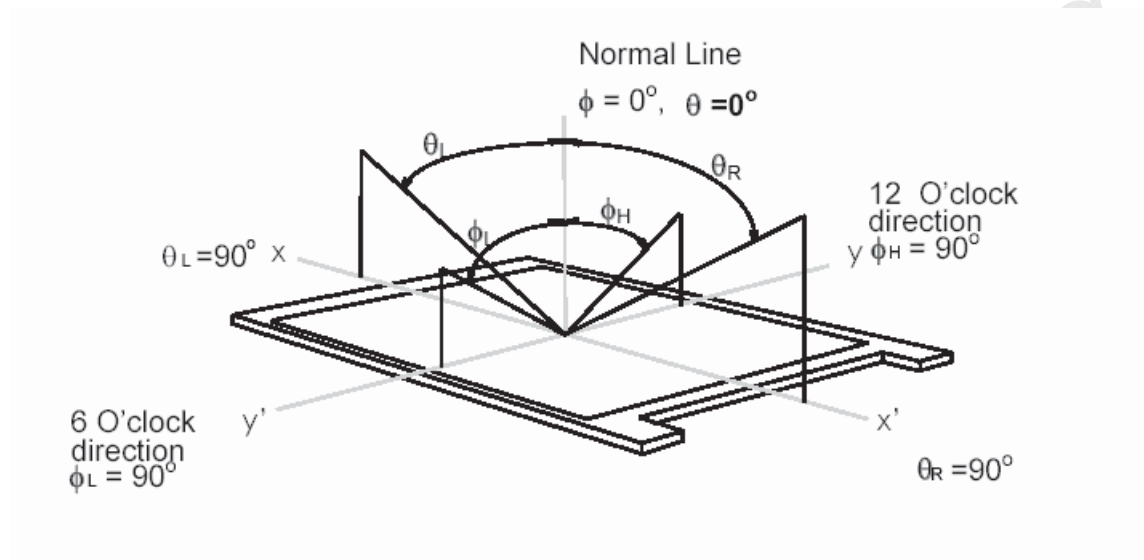


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### Note 9. Definition of viewing angle

Viewing angle is the measurement of contrast ratio  $\geq 10$ , at the screen center, over a  $180^\circ$  horizontal and  $180^\circ$  vertical range (off-normal viewing angles). The  $180^\circ$  viewing angle range is broken down as follows;  $90^\circ$  ( $\theta$ ) horizontal left and right and  $90^\circ$  ( $\Phi$ ) vertical, high (up) and low (down). The measurement direction is typically perpendicular to the display surface with the screen rotated about its center to develop the desired measurement viewing angle.



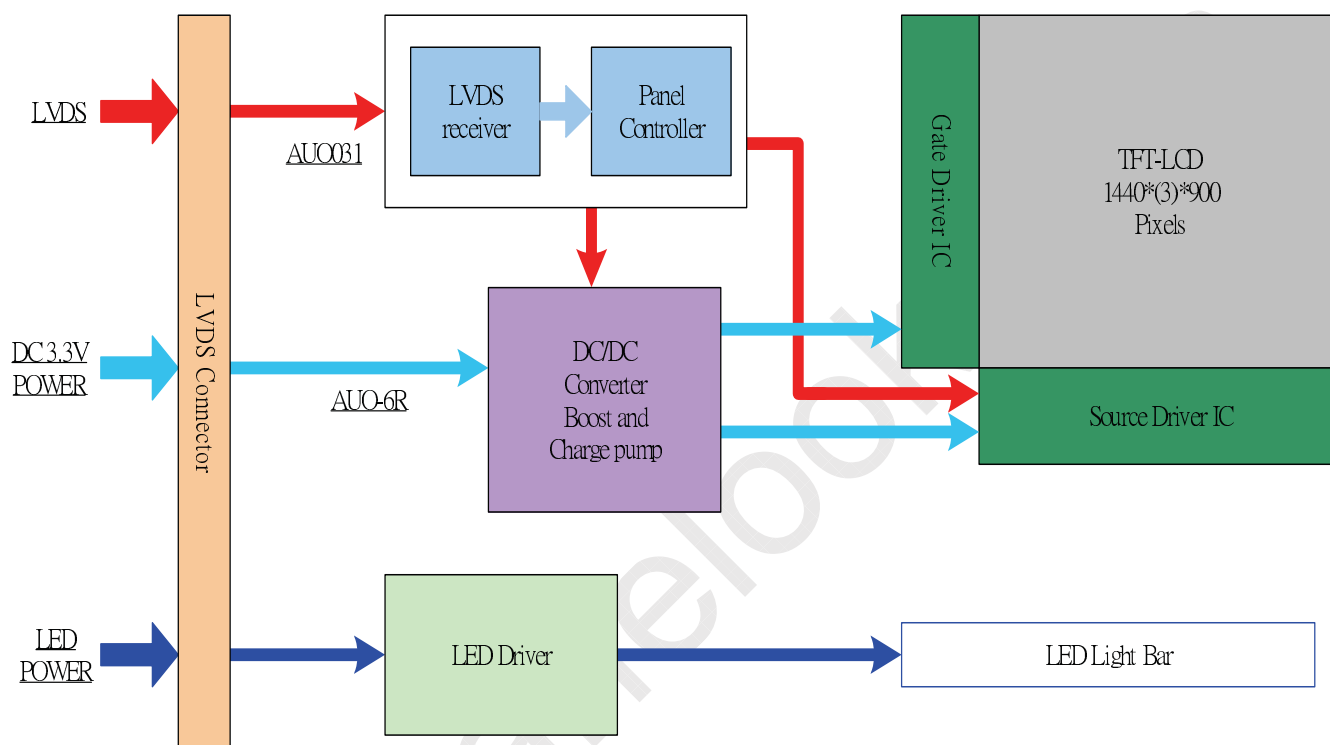


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### 3. Functional Block Diagram

The following diagram shows the functional block of the 14.1 inches wide Color TFT/LCD Module:





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### 4. Absolute Maximum Ratings

An absolute maximum rating of the module is as following:

#### 4.1 Absolute Ratings of TFT LCD Module

| Item                    | Symbol | Min  | Max  | Unit   | Conditions |
|-------------------------|--------|------|------|--------|------------|
| Logic/LCD Drive Voltage | Vin    | -0.3 | +4.0 | [Volt] | Note 1,2   |

#### 4.2 Absolute Ratings of Environment

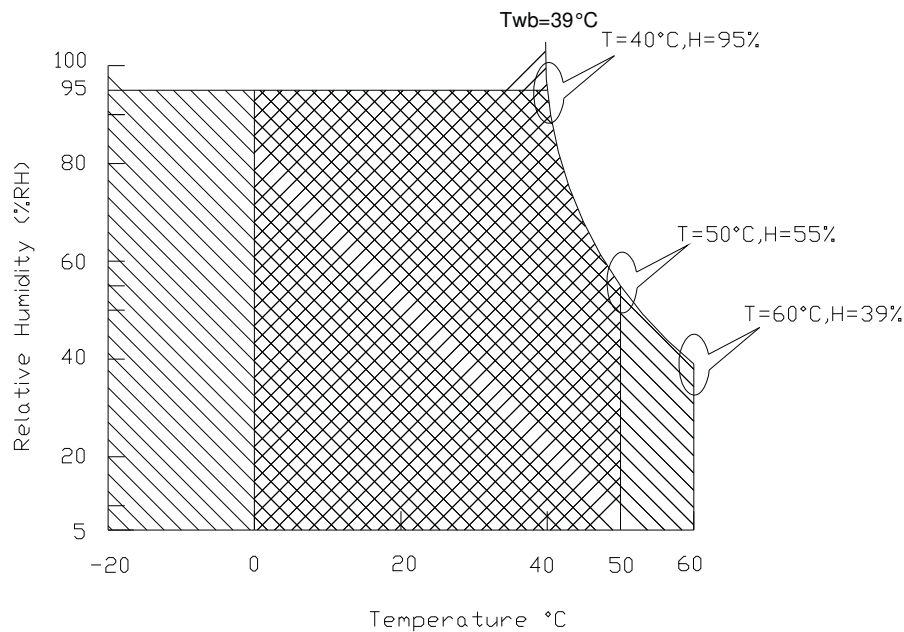
| Item                  | Symbol | Min | Max | Unit  | Conditions |
|-----------------------|--------|-----|-----|-------|------------|
| Operating Temperature | TOP    | 0   | +50 | [°C]  | Note 4     |
| Operation Humidity    | HOP    | 5   | 95  | [%RH] | Note 4     |
| Storage Temperature   | TST    | -20 | +60 | [°C]  | Note 4     |
| Storage Humidity      | HST    | 5   | 95  | [%RH] | Note 4     |

Note 1: At Ta (25°C )



Note 2: Permanent damage to the device may occur if exceed maximum values

Note 3: LED specification refer to section 5.2

**Note 4: For quality performance, please refer to AUO IIS (Incoming Inspection Standard).**



Operating Range 

Storage Range  + 



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## 5. Electrical characteristics

## 5.1 TFT LCD Module

### 5.1.1 Power Specification

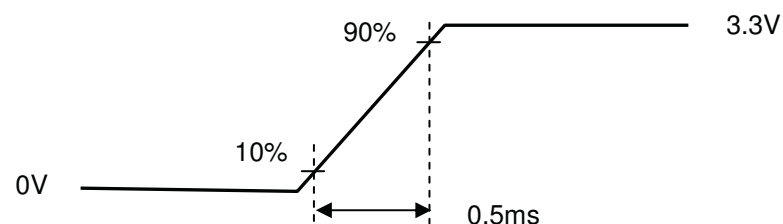
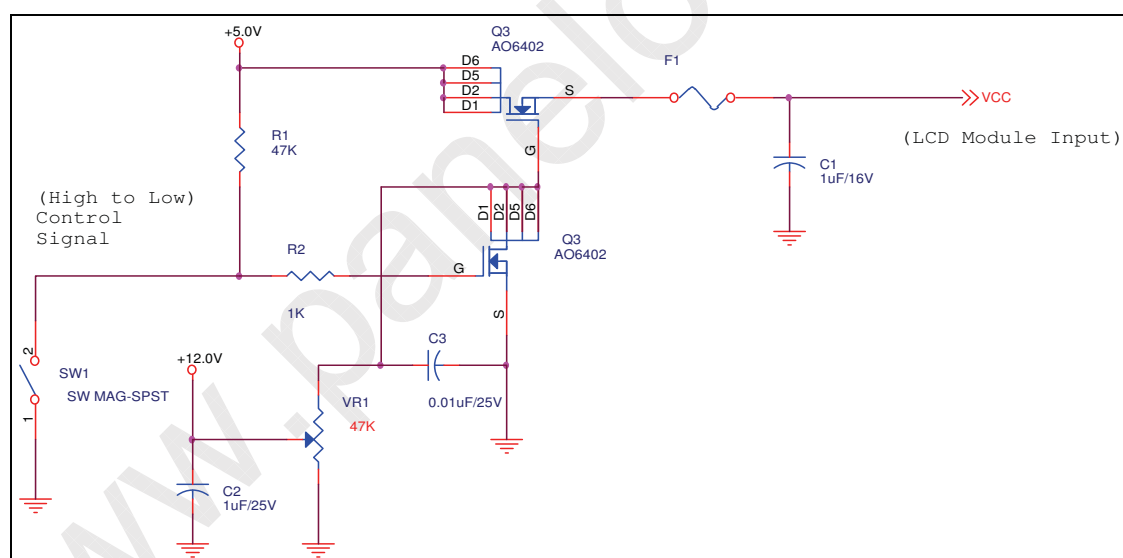
Input power specifications are as follows;

| Symble | Parameter                                | Min | Typ | Max  | Units       | Note     |
|--------|--|-----|-----|------|-------------|----------|
| VDD    | Logic/LCD Drive Voltage                  | 3.0 | 3.3 | 3.6  | [Volt]      |          |
| PDD    | VDD Power                                | -   | -   | 1.5  | [Watt]      | Note 1/2 |
| IDD    | IDD Current                              | -   | 310 | 415  | [mA]        | Note 1/2 |
| IRush  | Inrush Current                           | -   | -   | 2000 | [mA]        | Note 3   |
| VDDrp  | Allowable Logic/LCD Drive Ripple Voltage | -   | -   | 100  | [mV]<br>p-p |          |

Note 1 : Maximum Measurement Condition : Black Pattern

Note 2 : Typical Measurement Condition: Mosaic Pattern

Note 3 : Measure Condition



### Vin rising time



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### 5.1.2 Signal Electrical Characteristics

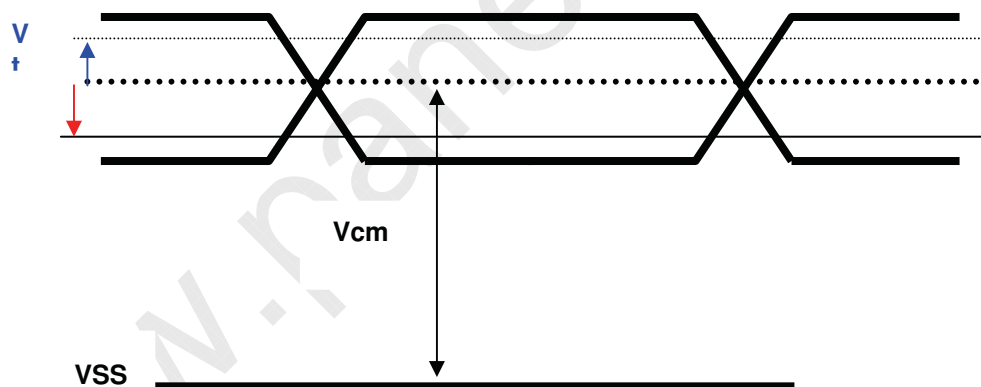
Input signals shall be low or High-impedance state when VDD is off.

It is recommended to refer the specifications of THC63LVDF84A (Thine Electronics Inc.) in detail.

Signal electrical characteristics are as follows;

| Parameter | Condition  | Min  | Max  | Unit |
|-----------|--|------|------|------|
| Vth       | Differential Input High Threshold ( $V_{cm}=+1.2V$ ) | -    | 100  | [mV] |
| Vtl       | Differential Input Low Threshold ( $V_{cm}=+1.2V$ )  | -100 | -    | [mV] |
| Vcm       | Differential Input Common Mode Voltage               | 1.1  | 1.45 | [V]  |

Note: LVDS Signal Waveform





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### 5.2 Backlight Unit

LED Parameter guideline for LED driving selection

| Parameter             | Symbol    | Min    | Typ   | Max  | Units  | Condition   |
|-----------------------|-----------|--------|-------|------|--------|---|
| LED Forward Voltage   | $V_F$     | 2.8    | 3.2   | 3.5  | [Volt] | (Ta=25°C)   |
| LED Forward Current   | $I_F$     |        | 20    | 20.6 | [mA]   | (Ta=25°C)   |
| LED Power consumption | $P_{LED}$ |        | 3.456 |      | [Watt] | (Ta=25°C)<br>Note 1   |
| LED Life-Time         | N/A       | 15,000 | -     | -    | Hour   | (Ta=25°C)<br><b><math>I_F=20\text{ mA}</math></b><br>Note 2 |

**Note 1:** Calculator value for reference  $P_{LED} = I_F \times V_F \times LED(Qty)$

**Note 2:** The LED life-time define as the estimated time to 50% degradation of initial luminous.





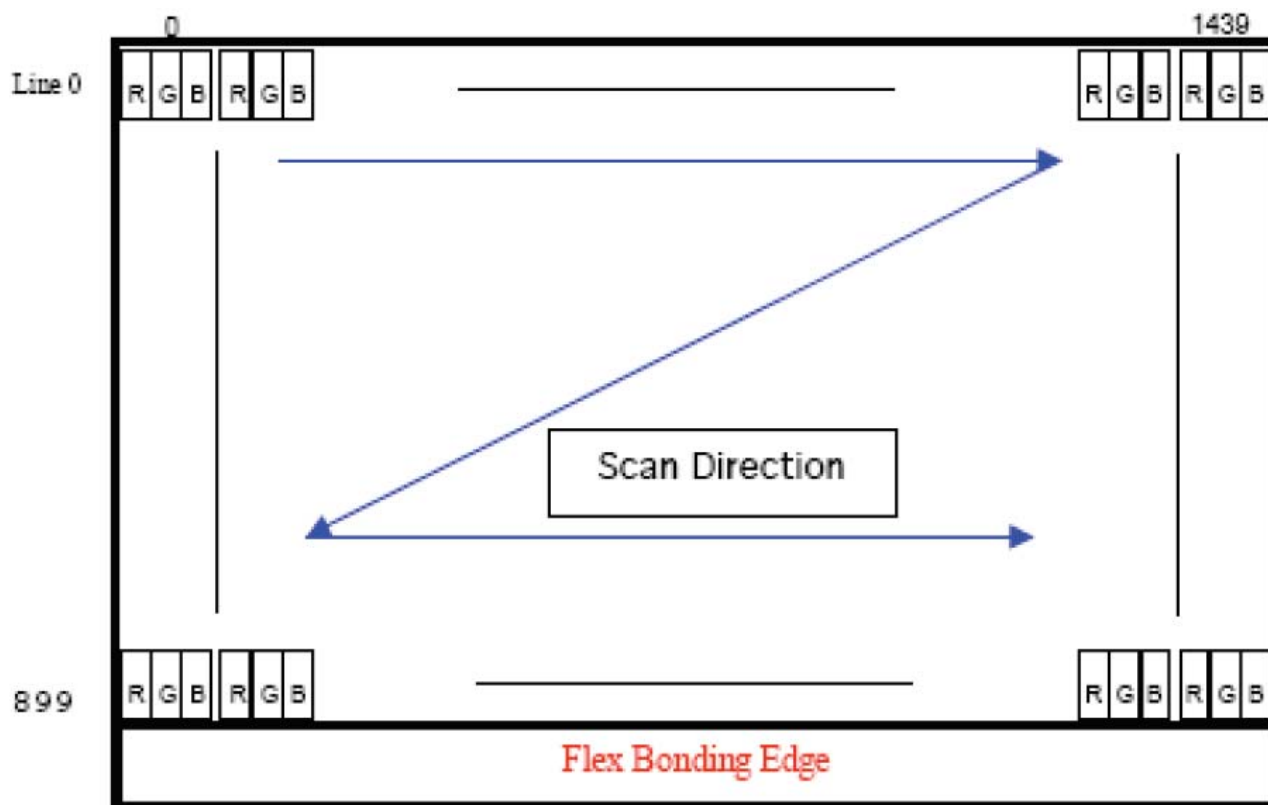
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### 6. Signal Characteristic

#### 6.1 Pixel Format Image

Following figure shows the relationship of the input signals and LCD pixel format.

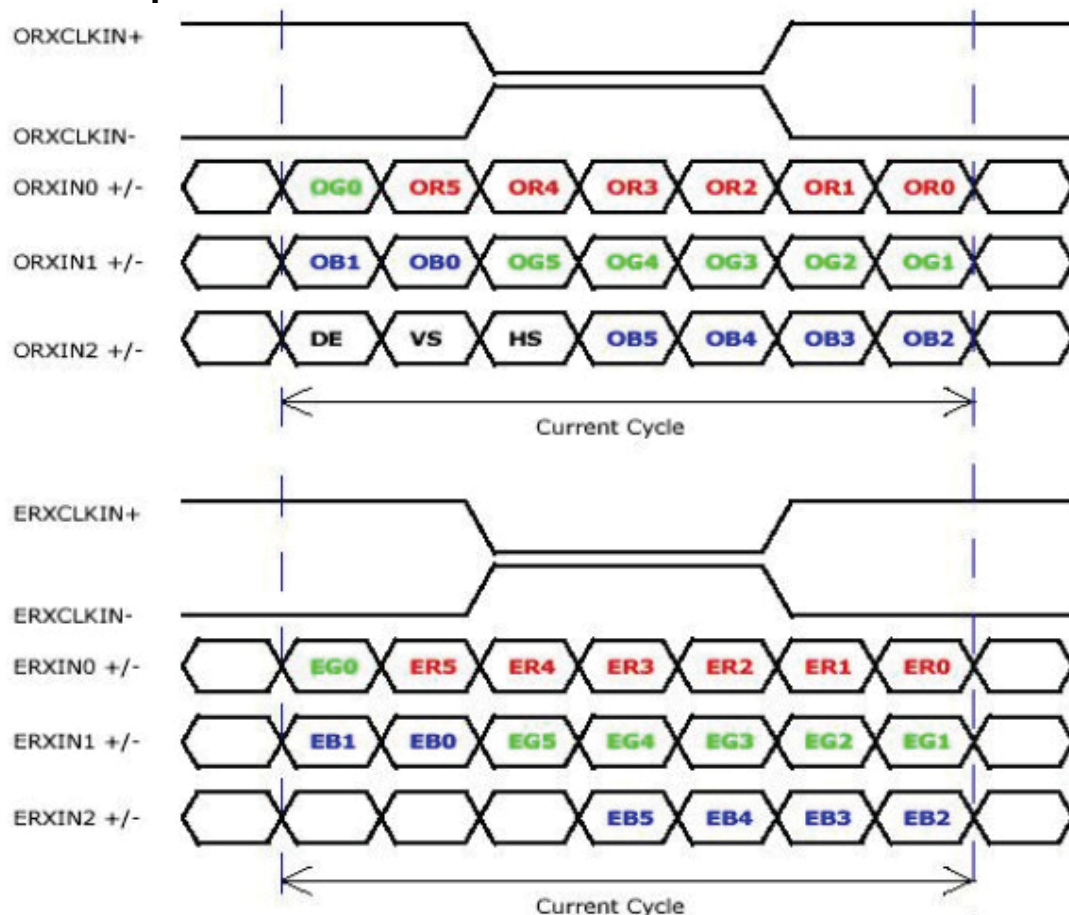




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### 6.2 The input data format



| Signal Name          | Description   |
|----------------------|---|
| V <sub>EDID</sub>    | +3.3V EDID Power  |
| CLK <sub>EDID</sub>  | EDID Clock Input  |
| DATA <sub>EDID</sub> | EDID Data Input   |
| ORXIN0-, ORXIN0+     | Odd LVDS differential data input(ORed0-ORed5, OGreen0)            |
| ORXIN1-, ORXIN1+     | Odd LVDS differential data input(OGreen1-OGreen5, OBlue0-OBue1)   |
| ORXIN2-, ORXIN2+     | Odd LVDS differential data input(OBlue2-OBlue5, Hsync, Vsync, DE) |
| ORXCLKIN-, ORXCLKIN+ | Odd LVDS differential clock input                                 |
| ERXIN0-, ERXIN0+     | Even LVDS differential data input(ERed0-ERed5, EGreen0)           |
| ERXIN1-, ERXIN1+     | Even LVDS differential data input(EGreen1-EGreen5, EBlue0-EBlue1) |
| ERXIN2-, ERXIN2+     | Even LVDS differential data input(EBlue2-EBlue5)                  |
| ERXCLKIN-, ERXCLKIN+ | Even LVDS differential clock input                                |
| VDD                  | +3.3V Power Supply  |
| GND                  | Ground  |

Note: Output signals from any system shall be low or High-impedance state when VDD is off.

Note: Output signals from any system shall be low or High-impedance state when VDD is off.



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## 6.3 Integration Interface and Pin Assignment

LVDS is a differential signal technology for LCD interface and high speed data transfer device.

| Pin No. | Pin Name          | Pin Description  |
|---------|-------------------|--|
| 1       | Test Loop         | Test Loop (only to pin 30)                                       |
| 2       | VEEDID            | EDID 3.3V power  |
| 3       | VSS               | Ground (Panel logic, BL logic)                                   |
| 4       | CLK EEDID         | EDID clock   |
| 5       | DATA EEDID        | EDID data  |
| 6       | VSS               | Ground (Panel logic, BL logic)                                   |
| 7       | Odd_Rin0-         | - LVDS differential data input (R0-R5, G0)                       |
| 8       | Odd_Rin0+         | + LVDS differential data input (R0-R5, G0)                       |
| 9       | VSS1              | Ground – Shield LVDS Ch1   |
| 10      | Odd_Rin1-         | - LVDS differential data input (G1-G5, B0-B1) (odd pixels)       |
| 11      | Odd_Rin1+         | + LVDS differential data input (G1-G5, B0-B1) (odd pixels)       |
| 12      | VSS2              | Ground – Shield LVDS Ch2   |
| 13      | Odd_Rin2-         | - LVDS differential data input (B2-B5, HS, VS, DE) (odd pixels)  |
| 14      | Odd_Rin2+         | + LVDS differential data input (B2-B5, HS, VS, DE) (odd pixels)  |
| 15      | VSS3              | Ground – Shield LVDS Ch3   |
| 16      | Odd_ClkIN-        | - LVDS differential clock input (odd pixels)                     |
| 17      | Odd_ClkIN+        | + LVDS differential clock input (odd pixels)                     |
| 18      | VSS4              | Ground – Shield LVDS Ch4   |
| 19      | Even_Rin0-        | - LVDS differential data input (R0-R5, G0) (even pixels)         |
| 20      | Even_Rin0+        | + LVDS differential data input (R0-R5, G0) (even pixels)         |
| 21      | VSS5              | Ground – Shield LVDS Ch5   |
| 22      | Even_Rin1-        | - LVDS differential data input (G1-G5, B0-B1) (even pixels)      |
| 23      | Even_Rin1+        | + LVDS differential data input (G1-G5, B0-B1) (even pixels)      |
| 24      | VSS6              | Ground – Shield LVDS Ch6   |
| 25      | Even_Rin2-        | - LVDS differential data input (B2-B5, HS, VS, DE) (even pixels) |
| 26      | Even_Rin2+        | + LVDS differential data input (B2-B5, HS, VS, DE) (even pixels) |
| 27      | VSS7              | Ground – Shield LVDS Ch7   |
| 28      | Even_ClkIN-       | - LVDS differential clock input (even pixels)                    |
| 29      | Even_ClkIN+       | + LVDS differential clock input (even pixels)                    |
| 30      | Test Loop         | Test Loop (only to pin 1)  |
| 31      | CONNTST           | Connector test (this pin connected to pin 50 only) See note 1    |
| 32      | VDD               | Logic power 3.3V (Panel logic, BL logic)                         |
| 33      | VDD               | Logic power 3.3V (Panel logic, BL logic)                         |
| 34      | TEST<br>(BIST_EN) | Panel Self Test  |

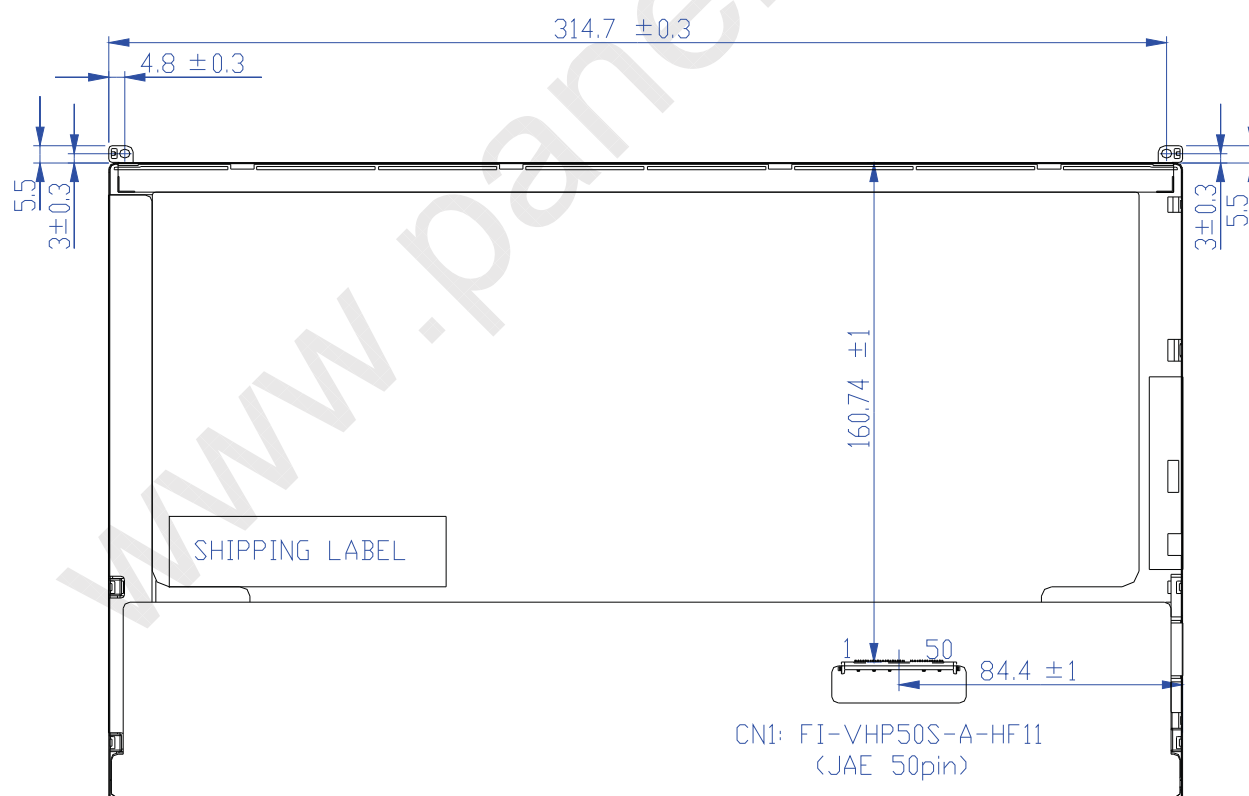


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|    |          |   |
|----|----------|---|
| 35 | +5V_ALW  |   |
| 36 | VSS      |   |
| 37 | VSS      |   |
| 38 | PWM_BL   | PWM brightness control  |
| 39 | VBL-     | LED power return  |
| 40 | VBL-     | LED power return  |
| 41 | VBL-     | LED power return  |
| 42 | VBL-     | LED power return  |
| 43 | NC       | no connect  |
| 44 | VBL+     | 7V - 20V LED power  |
| 45 | VBL+     | 7V - 20V LED power  |
| 46 | VBL+     | 7V - 20V LED power  |
| 47 | VBL+     | 7V - 20V LED power  |
| 48 | SMB_DATA | SMBus Data  |
| 49 | SMB_CLK  | SMBus Clk   |
| 50 | CONNTST  | Connector test (this pin to be connected to pin 31 only) See note 1 |

Note1: Start from right side



Note2: Input signals shall be low or High-impedance state when VDD is off.

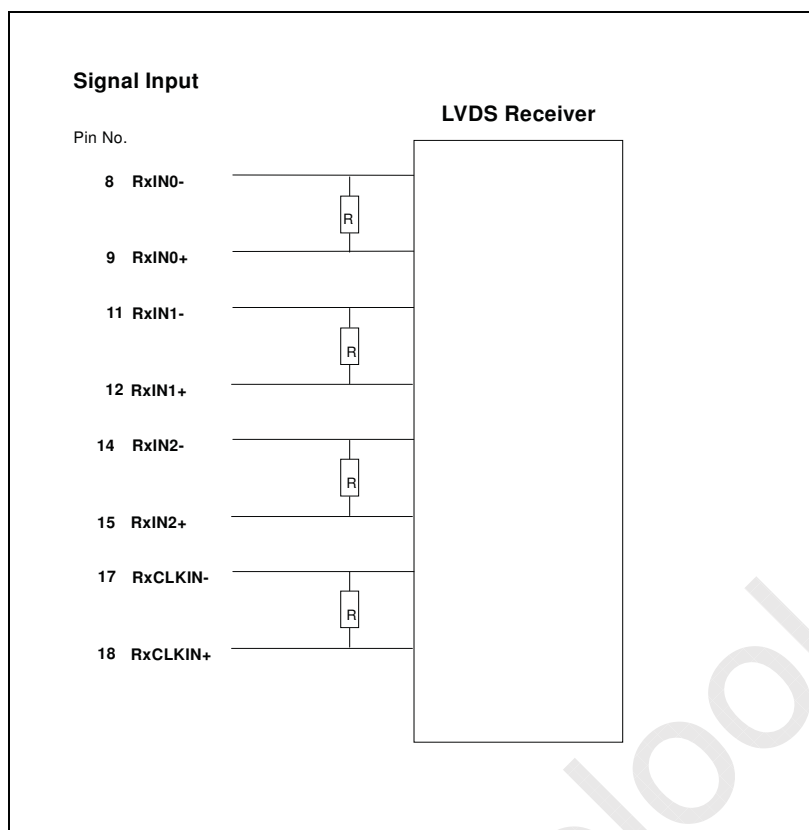


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internal circuit of LVDS inputs are as following.

The module uses a 100ohm resistor between positive and negative data lines of each receiver input





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### 6.4 Interface Timing

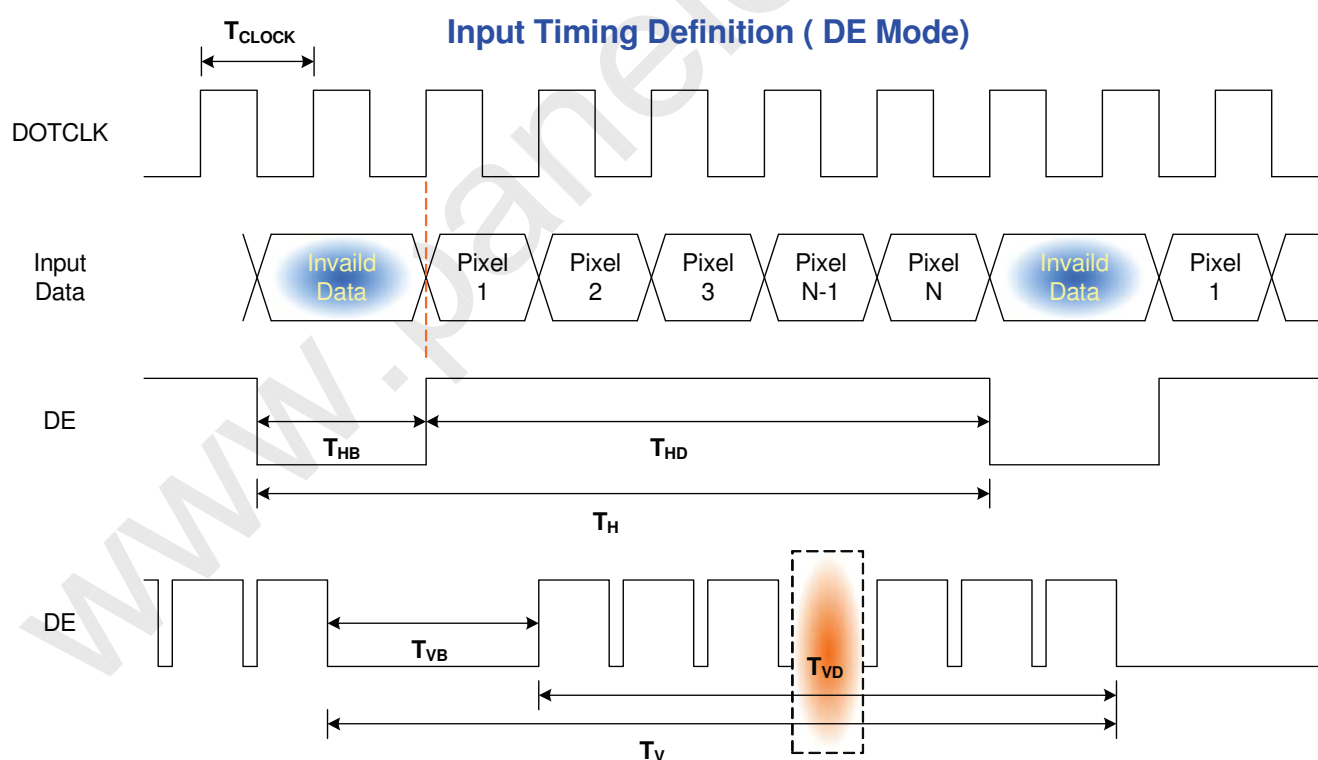
#### 6.4.1 Timing Characteristics

Basically, interface timings should match the 1440x900 /60Hz manufacturing guide line timing.

| Parameter          |          | Symbol               | Min. | Typ. | Max. | Unit               |
|--------------------|----------|----------------------|------|------|------|--------------------|
| Frame Rate         |          | -                    | 50   | 60   | -    | Hz                 |
| Clock frequency    |          | $1/T_{\text{Clock}}$ |      | 48.2 | 60.2 | MHz                |
| Vertical Section   | Period   | $T_V$                | 904  | 912  | 2048 | $T_{\text{Line}}$  |
|                    | Active   | $T_{VD}$             | 900  | 900  | 900  |                    |
|                    | Blanking | $T_{VB}$             | 4    | 12   |      |                    |
| Horizontal Section | Period   | $T_H$                | 760  | 880  | 1024 | $T_{\text{Clock}}$ |
|                    | Active   | $T_{HD}$             | 720  | 720  | 720  |                    |
|                    | Blanking | $T_{HB}$             | 40   | 160  |      |                    |

Note : DE mode only

#### 6.4.2 Timing diagram





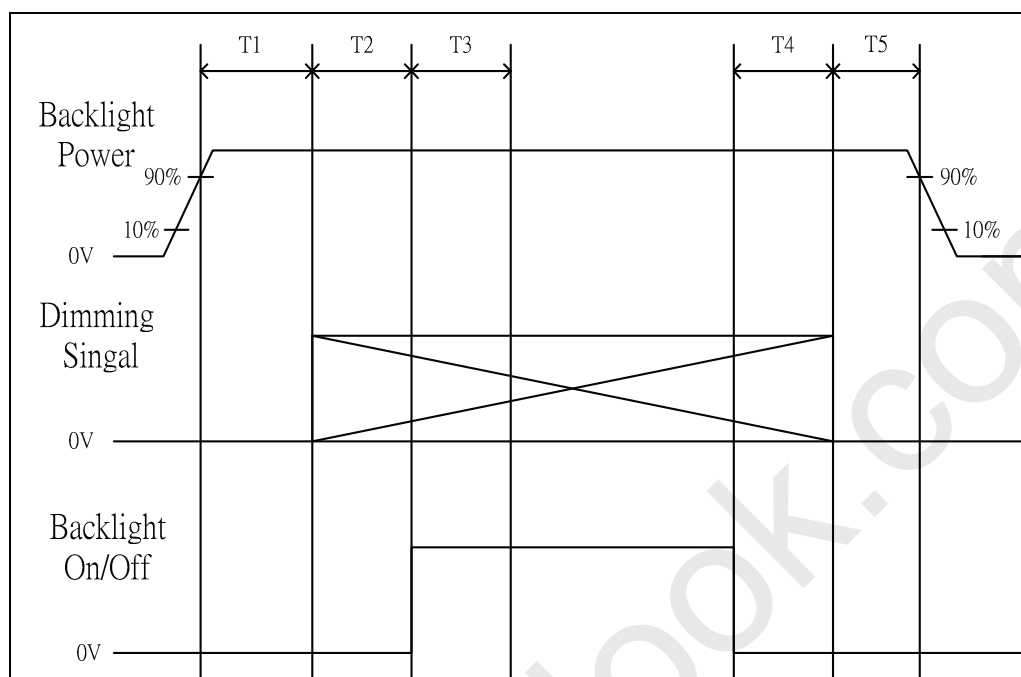


## Product Specification

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### 6.5 Power ON/OFF Sequence

LED on/off sequence is as follows. Interface signals are also shown in the chart.



| Parameter | Value |      |      | Units |
|-----------|-------|------|------|-------|
|           | Min.  | Typ. | Max. |       |
| T1        | 0.5   | -    | 10   | (ms)  |
| T2        | 0     | -    | 50   | (ms)  |
| T3        | 0     | -    | 50   | (ms)  |
| T4        | 400   | -    | -    | (ms)  |
| T5        | 200   | -    | -    | (ms)  |
| T6        | 200   | -    | -    | (ms)  |
| T7        | 0     | -    | 10   | (ms)  |

Note: The duty of LED dimming signal should be more than 20% in T2 and T3.





## Product Specification

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### 7. Connector Description

Physical interface is described as for the connector on module.

These connectors are capable of accommodating the following signals and will be following components.

#### 7.1 TFT LCD Module

| Connector Name / Designation | For Signal Connector |
|------------------------------|----------------------|
| Manufacturer                 | JAE                  |
| Type / Part Number           | FI-VHP50S-A-HF11     |
| Mating Housing/Part Number   | FI-VHP50C-A          |



# Product Specification

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## 8. LED Driving Specification

### 8.1 Connector Description

It is a integrative interface and comibe into LVDS connector. The type and mating refer to section 7.

### 8.2 Pin Assignment

| PIN# | Signal Name    | Description   |
|------|----------------|---|
| 31   | CONNTST        | Connector test (this pin connected to pin 50 only) See note 1       |
| 32   | VDD            | Logic power 3.3V (Panel logic, BL logic)                            |
| 33   | VDD            | Logic power 3.3V (Panel logic, BL logic)                            |
| 34   | TEST (BIST_EN) | Panel Self Test   |
| 35   | +5V_ALW        |   |
| 36   | VSS            |   |
| 37   | VSS            |   |
| 38   | PWM_BL         | PWM brightness control  |
| 39   | VBL-           | LED power return  |
| 40   | VBL-           | LED power return  |
| 41   | VBL-           | LED power return  |
| 42   | VBL-           | LED power return  |
| 43   | NC             | no connect  |
| 44   | VBL+           | 7V - 20V LED power  |
| 45   | VBL+           | 7V - 20V LED power  |
| 46   | VBL+           | 7V - 20V LED power  |
| 47   | VBL+           | 7V - 20V LED power  |
| 48   | SMB_DATA       | SMBus Data  |
| 49   | SMB_CLK        | SMBus Clk   |
| 50   | CONNTST        | Connector test (this pin to be connected to pin 31 only) See note 1 |



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### 9. Vibration and Shock Test

#### 9.1 Vibration Test

**Test Spec:**

- Test method: Non-Operation
- Acceleration: 1.5 G
- Frequency: 10 - 500Hz Random
- Sweep: 30 Minutes each Axis (X, Y, Z)

#### 9.2 Shock Test Spec:

**Test Spec:**

- Test method: Non-Operation
- Acceleration: 220 G , Half sine wave
- Active time: 2 ms
- Pulse: X,Y,Z .one time for each side



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### 10. Reliability

| Items                      | Required Condition                              | Note   |
|----------------------------|---|--------|
| Temperature Humidity Bias  | Ta= 40℃ , 95%RH, 300h                           |        |
| High Temperature Operation | Ta= 50℃ , Dry, 300h                             |        |
| Low Temperature Operation  | Ta= 0℃ , 300h                                   |        |
| High Temperature Storage   | Ta= 65℃ , 20%RH, 300h                           |        |
| Low Temperature Storage    | Ta= -20℃ , 50%RH, 300h                          |        |
| Thermal Shock Test         | Ta=-40℃ to 65℃ , Duration at 30 min, 100 cycles |        |
| ESD                        | Contact : ±8 KV<br>Air : ±15 KV                 | Note 1 |

**Note1:** According to EN 61000-4-2 , ESD class B: Some performance degradation allowed. No data lost  
Self-recoverable. No hardware failures.

**Remark:** MTBF (Excluding the LED): 30,000 hours with a confidence level 90%

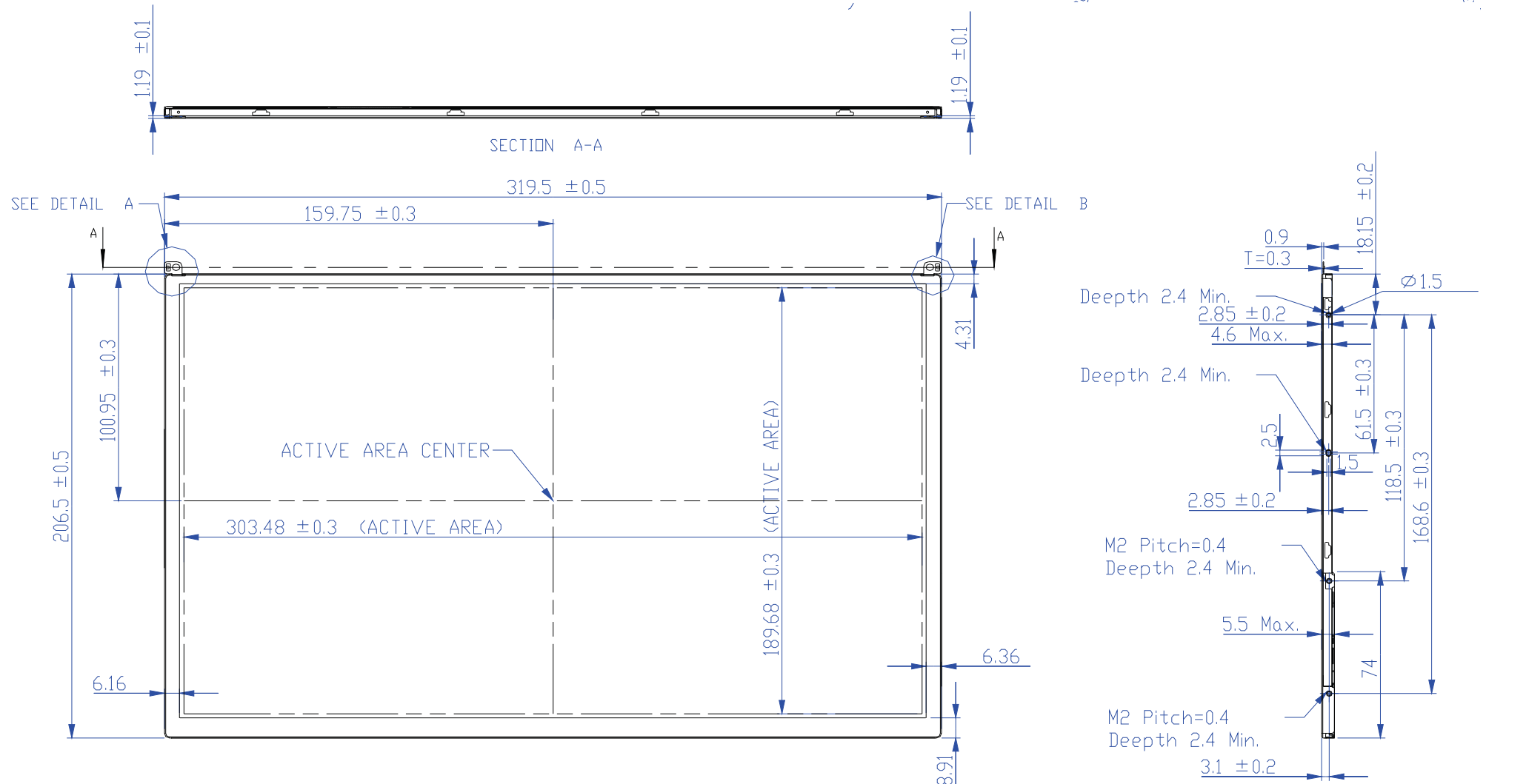


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## 11. Mechanical Characteristics

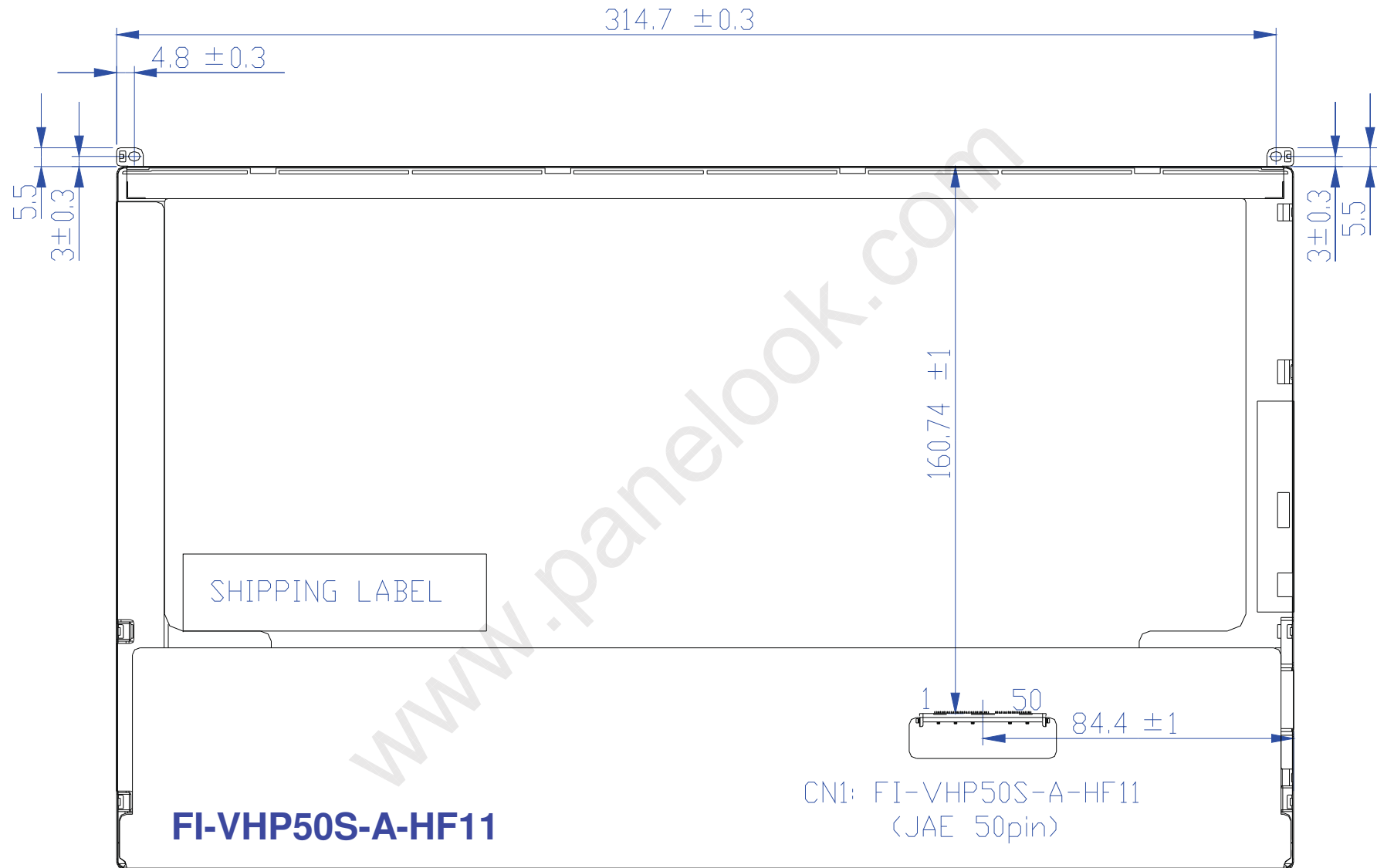
## 11.1 LCM Outline Dimension





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## Product Specification

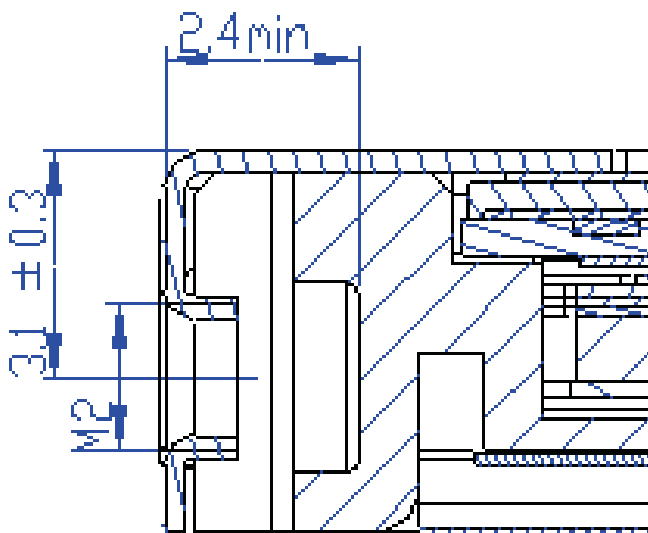
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### 11.2 Screw Hole Depth and Center Position

Screw hole minimum depth, from side surface = 2.4 mm (See drawing)

Screw hole center location, from front surface =  $3.1 \pm 0.3$ mm (See drawing)

Screw Torque: Maximum 2.5 kgf-cm





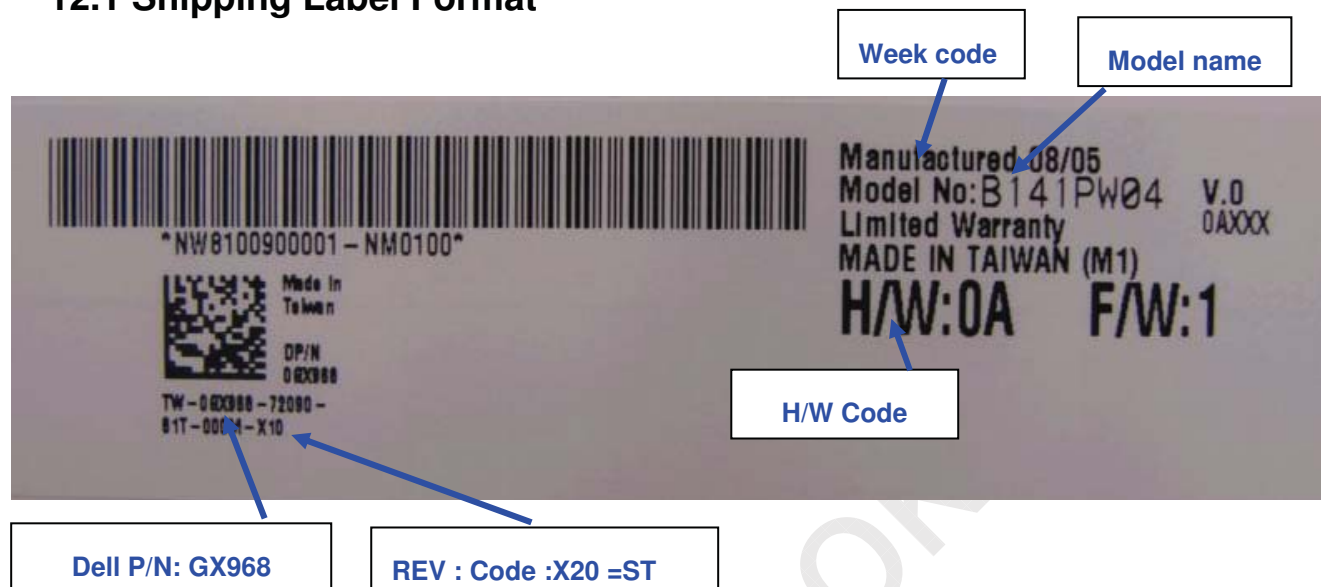


## Product Specification

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### 12. Shipping and Package

#### 12.1 Shipping Label Format



| Build Name(s) | Revision Code(s)       |
|---------------|------------------------|
| SST (WS)      | X00, X01, X02, ... X09 |
| PT (ES)       | X10, X11, X12, ... X19 |
| ST (CS)       | X20, X21, X23, ... X29 |
| XB (MP)       | A00, A01, A02, ... A99 |

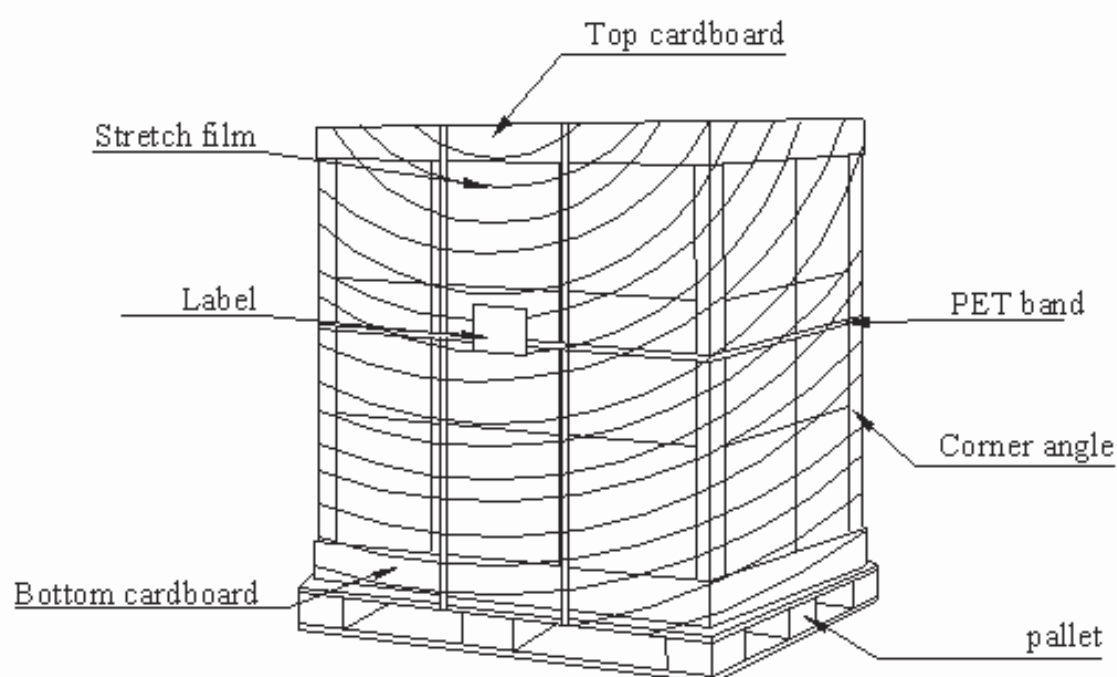
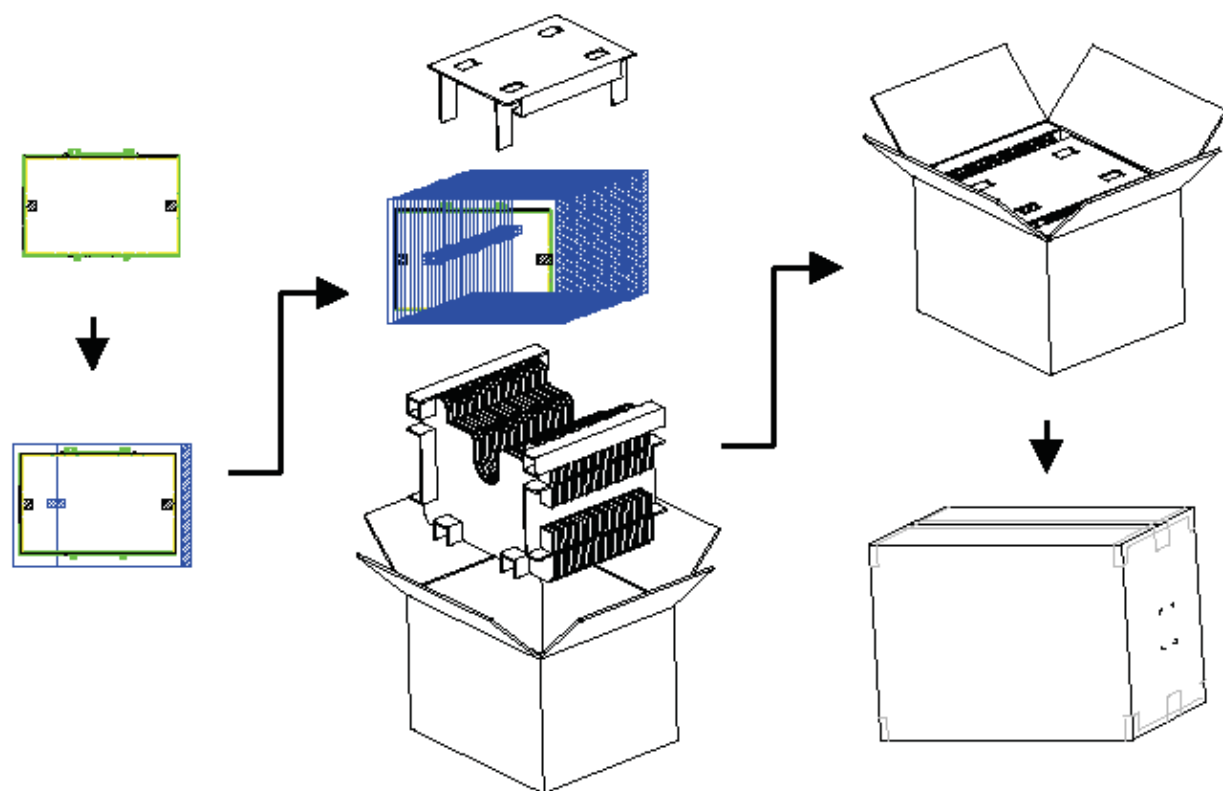


## Product Specification

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### 12.2 Carton package

The outside dimension of carton is 412 (L)mm x 377 (W)mm x 307 (H)mm





## Product Specification

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## 13. Appendix: EDID description

| Address | FUNCTION   | Value | Value    | Value | Note |
|---------|--|-------|----------|-------|------|
| HEX     |  | HEX   | BIN      | DEC   |      |
| 0       | Header   | 00    | 00000000 | 0     | 0    |
| 1       | Header   | FF    | 11111111 | 255   | 1    |
| 2       | Header   | FF    | 11111111 | 255   | 2    |
| 3       | Header   | FF    | 11111111 | 255   | 3    |
| 4       | Header   | FF    | 11111111 | 255   | 4    |
| 5       | Header   | FF    | 11111111 | 255   | 5    |
| 6       | Header   | FF    | 11111111 | 255   | 6    |
| 7       | Header   | 00    | 00000000 | 0     | 7    |
| 8       | EISA manufacture code = 3 Character ID                                 | 06    | 00000110 | 6     | 8    |
| 9       | EISA manufacture code (Compressed ASCII)                               | AF    | 10101111 | 175   | 9    |
| 0A      | Panel Supplier Reserved – Product Code                                 | 47    | 01000111 | 71    | 0A   |
| 0B      | Panel Supplier Reserved – Product Code                                 | 40    | 01000000 | 64    | 0B   |
| 0C      | LCD module Serial No - Preferred but Optional<br>("0" if not used)     | 00    | 00000000 | 0     | 0C   |
| 0D      | LCD module Serial No - Preferred but Optional<br>("0" if not used)     | 00    | 00000000 | 0     | 0D   |
| 0E      | LCD module Serial No - Preferred but Optional<br>("0" if not used)     | 00    | 00000000 | 0     | 0E   |
| 0F      | LCD module Serial No - Preferred but Optional<br>("0" if not used)     | 00    | 00000000 | 0     | 0F   |
| 10      | Week of manufacture  | 01    | 00000001 | 1     | 10   |
| 11      | Year of manufacture  | 11    | 00010001 | 17    | 11   |
| 12      | EDID structure version # = 1   | 01    | 00000001 | 1     | 12   |
| 13      | EDID revision # = 3  | 03    | 00000011 | 3     | 13   |
| 14      | Video I/P definition = Digital I/P (80h)                               | 90    | 10010000 | 144   | 14   |
| 15      | Max H image size = cm(Rounded to cm)                                   | 1E    | 00011110 | 30    | 15   |
| 16      | Max V image size = cm(Rounded to cm)                                   | 13    | 00010011 | 19    | 16   |
| 17      | Display gamma = (gamma ×100)-100 =<br>Example: ( 2.2×100 ) – 100 = 120 | 78    | 01111000 | 120   | 17   |
| 18      | Feature support ( no DPMS, Active off, RGB, timing<br>BLK 1)           | 0A    | 00001010 | 10    | 18   |
| 19      | Red/Green Low bit (RxRy/GxGy)  | 89    | 10001001 | 137   | 19   |
| 1A      | Blue/White Low bit (BxBY/WxWy)   | E5    | 11100101 | 229   | 1A   |



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|    |   |      |    |          |     |           |
|----|---|------|----|----------|-----|-----------|
| 1B | Red X   | Rx = | 94 | 10010100 | 148 | <b>1B</b> |
| 1C | Red Y   | Ry = | 57 | 01010111 | 87  | <b>1C</b> |
| 1D | Green X   | Gx = | 54 | 01010100 | 84  | <b>1D</b> |
| 1E | Green Y   | Gy = | 93 | 10010011 | 147 | <b>1E</b> |
| 1F | Blue X  | Bx = | 27 | 00100111 | 39  | <b>1F</b> |
| 20 | Blue Y  | By = | 22 | 00100010 | 34  | <b>20</b> |
| 21 | White X   | Wx = | 50 | 01010000 | 80  | <b>21</b> |
| 22 | White Y   | Wy = | 54 | 01010100 | 84  | <b>22</b> |
| 23 | Established timings 1 (00h if not used)                       |      | 00 | 00000000 | 0   | <b>23</b> |
| 24 | Established timings 2 (00h if not used)                       |      | 00 | 00000000 | 0   | <b>24</b> |
| 25 | Manufacturer's timings (00h if not used)                      |      | 00 | 00000000 | 0   | <b>25</b> |
| 26 | Standard timing ID1 (01h if not used)                         |      | 01 | 00000001 | 1   | <b>26</b> |
| 27 | Standard timing ID1 (01h if not used)                         |      | 01 | 00000001 | 1   | <b>27</b> |
| 28 | Standard timing ID2 (01h if not used)                         |      | 01 | 00000001 | 1   | <b>28</b> |
| 29 | Standard timing ID2 (01h if not used)                         |      | 01 | 00000001 | 1   | <b>29</b> |
| 2A | Standard timing ID3 (01h if not used)                         |      | 01 | 00000001 | 1   | <b>2A</b> |
| 2B | Standard timing ID3 (01h if not used)                         |      | 01 | 00000001 | 1   | <b>2B</b> |
| 2C | Standard timing ID4 (01h if not used)                         |      | 01 | 00000001 | 1   | <b>2C</b> |
| 2D | Standard timing ID4 (01h if not used)                         |      | 01 | 00000001 | 1   | <b>2D</b> |
| 2E | Standard timing ID5 (01h if not used)                         |      | 01 | 00000001 | 1   | <b>2E</b> |
| 2F | Standard timing ID5 (01h if not used)                         |      | 01 | 00000001 | 1   | <b>2F</b> |
| 30 | Standard timing ID6 (01h if not used)                         |      | 01 | 00000001 | 1   | <b>30</b> |
| 31 | Standard timing ID6 (01h if not used)                         |      | 01 | 00000001 | 1   | <b>31</b> |
| 32 | Standard timing ID7 (01h if not used)                         |      | 01 | 00000001 | 1   | <b>32</b> |
| 33 | Standard timing ID7 (01h if not used)                         |      | 01 | 00000001 | 1   | <b>33</b> |
| 34 | Standard timing ID8 (01h if not used)                         |      | 01 | 00000001 | 1   | <b>34</b> |
| 35 | Standard timing ID8 (01h if not used)                         |      | 01 | 00000001 | 1   | <b>35</b> |
| 36 | Pixel Clock/10,000 (LSB)                                      |      | 9E | 10011110 | 158 | <b>36</b> |
| 37 | Pixel Clock/10,000 (MSB)                                      |      | 25 | 00100101 | 37  | <b>37</b> |
| 38 | Horizontal Active = pixels (lower 8 bits)                     |      | A0 | 10100000 | 160 | <b>38</b> |
| 39 | Horizontal Blanking (Thbp) = 320 pixels (lower 8 bits)        |      | 40 | 01000000 | 64  | <b>39</b> |
| 3A | Horizontal Active/Horizontal blanking (Thbp) (upper 4:4 bits) |      | 51 | 01010001 | 81  | <b>3A</b> |
| 3B | Vertical Active = lines                                       |      | 84 | 10000100 | 132 | <b>3B</b> |
| 3C | Vertical Blanking (Tvbp) = lines (DE Blanking typ.)           |      | 0C | 00001100 | 12  | <b>3C</b> |



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|    |  |    |          |     |           |
|----|--|----|----------|-----|-----------|
|    | for DE only panels)  |    |          |     |           |
| 3D | Vertical Active : Vertical Blanking (Tvbp)<br>(upper4:4 bits)  | 30 | 00110000 | 48  | <b>3D</b> |
| 3E | Horizontal Sync, Offset (Thfp) = pixels  | 40 | 01000000 | 64  | <b>3E</b> |
| 3F | Horizontal Sync, Pulse Width = pixels  | 20 | 00100000 | 32  | <b>3F</b> |
| 40 | Vertical Sync, Offset (Tvfp) = lines      Sync<br>Width = lines                                      | 33 | 00110011 | 51  | <b>40</b> |
| 41 | Horizontal Vertical Sync Offset/Width upper 2 bits   | 00 | 00000000 | 0   | <b>41</b> |
| 42 | Horizontal Image Size = mm   | 2F | 00101111 | 47  | <b>42</b> |
| 43 | Vertical image Size = mm   | BD | 10111101 | 189 | <b>43</b> |
| 44 | Horizontal Image Size / Vertical image size  | 10 | 00010000 | 16  | <b>44</b> |
| 45 | Horizontal Border = 0 (Zero for Notebook LCD)  | 00 | 00000000 | 0   | <b>45</b> |
| 46 | Vertical Border = 0 (Zero for Notebook LCD)  | 00 | 00000000 | 0   | <b>46</b> |
| 47 | if display uses standard blanking (HSyncPolarity =<br>POS, VSyncPolarity = NEG), for DVD compliance. | 1A | 00011010 | 26  | <b>47</b> |
| 48 | Pixel Clock/10,000<br>(LSB)  | 9E | 10011110 | 158 | <b>48</b> |
| 49 | Pixel Clock/10,000<br>(MSB)  | 25 | 00100101 | 37  | <b>49</b> |
| 4A | Horizontal Active = xxxx pixels<br>(lower 8 bits)  | A0 | 10100000 | 160 | <b>4A</b> |
| 4B | Horizontal Blanking (Thbp) = xxxx pixels<br>(lower 8 bits)   | 40 | 01000000 | 64  | <b>4B</b> |
| 4C | Horizontal Active/Horizontal blanking (Thbp)<br>(upper4:4 bits)                                      | 51 | 01010001 | 81  | <b>4C</b> |
| 4D | Vertical Active = xxxx lines   | 84 | 10000100 | 132 | <b>4D</b> |
| 4E | Vertical Blanking (Tvbp) = xxxx lines (DE Blanking<br>typ. for DE only panels)                       | 0C | 00001100 | 12  | <b>4E</b> |
| 4F | Vertical Active : Vertical Blanking (Tvbp)<br>(upper4:4 bits)  | 30 | 00110000 | 48  | <b>4F</b> |
| 50 | Horizontal Sync, Offset (Thfp) = xxxx pixels   | 40 | 01000000 | 64  | <b>50</b> |
| 51 | Horizontal Sync, Pulse Width = xxxx pixels   | 20 | 00100000 | 32  | <b>51</b> |
| 52 | Vertical Sync, Offset (Tvfp) = xx lines      Sync<br>Width = xx lines                                | 33 | 00110011 | 51  | <b>52</b> |
| 53 | Horizontal Vertical Sync Offset/Width upper 2 bits   | 00 | 00000000 | 0   | <b>53</b> |
| 54 | Horizontal Image Size =xxx mm  | 2F | 00101111 | 47  | <b>54</b> |
| 55 | Vertical image Size = xxx mm   | BD | 10111101 | 189 | <b>55</b> |
| 56 | Horizontal Image Size / Vertical image size  | 10 | 00010000 | 16  | <b>56</b> |
| 57 | Horizontal Border = 0 (Zero for Notebook LCD)  | 00 | 00000000 | 0   | <b>57</b> |
| 58 | Vertical Border = 0 (Zero for Notebook LCD)  | 00 | 00000000 | 0   | <b>58</b> |





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|    |  |    |          |     |           |
|----|--|----|----------|-----|-----------|
|    | if display uses standard blanking (HSyncPolarity = POS, VSyncPolarity = NEG) , for DVD compliance.                                   | 1A | 00011010 | 26  | <b>59</b> |
| 5A | Flag   | 00 | 00000000 | 0   | <b>5A</b> |
| 5B | Flag   | 00 | 00000000 | 0   | <b>5B</b> |
| 5C | Flag   | 00 | 00000000 | 0   | <b>5C</b> |
| 5D | Dummy Descriptor   | FE | 11111110 | 254 | <b>5D</b> |
| 5E | Flag   | 00 | 00000000 | 0   | <b>5E</b> |
| 5F | Dell P/N 1 <sup>st</sup> Character : G   | 47 | 01000111 | 71  | <b>5F</b> |
| 60 | Dell P/N 2 <sup>nd</sup> Character : X   | 58 | 01011000 | 88  | <b>60</b> |
| 61 | Dell P/N 3 <sup>rd</sup> Character : 9   | 39 | 00111001 | 57  | <b>61</b> |
| 62 | Dell P/N 4 <sup>th</sup> Character : 6   | 36 | 00110110 | 54  | <b>62</b> |
| 63 | Dell P/N 5 <sup>th</sup> Character : 8   | 38 | 00111000 | 56  | <b>63</b> |
| 64 | EEDID Revision =   | 0B | 00001011 | 11  | <b>64</b> |
| 65 | Manufacturer P/N   | 42 | 01000010 | 66  | <b>65</b> |
| 66 | Manufacturer P/N   | 31 | 00110001 | 49  | <b>66</b> |
| 67 | Manufacturer P/N   | 34 | 00110100 | 52  | <b>67</b> |
| 68 | Manufacturer P/N   | 31 | 00110001 | 49  | <b>68</b> |
| 69 | Manufacturer P/N   | 50 | 01010000 | 80  | <b>69</b> |
| 6A | Manufacturer P/N   | 57 | 01010111 | 87  | <b>6A</b> |
| 6B | Manufacturer P/N (If <13 char, then terminate with ASCII code 0Ah, set remaining char = 20h)   | 34 | 00110100 | 52  | <b>6B</b> |
| 6C | Flag   | 00 | 00000000 | 0   | <b>6C</b> |
| 6D | Flag   | 00 | 00000000 | 0   | <b>6D</b> |
| 6E | Flag   | 00 | 00000000 | 0   | <b>6E</b> |
| 6F | Data Type Tag:   | 00 | 00000000 | 0   | <b>6F</b> |
| 70 | Flag   | 00 | 00000000 | 0   | <b>70</b> |
| 71 | SMBUS Value = nits   | 00 | 00000000 | 0   | <b>71</b> |
| 72 | SMBUS Value = nits   | 00 | 00000000 | 0   | <b>72</b> |
| 73 | SMBUS Value = nits   | 00 | 00000000 | 0   | <b>73</b> |
| 74 | SMBUS Value = nits   | 00 | 00000000 | 0   | <b>74</b> |
| 75 | SMBUS Value = nits   | 00 | 00000000 | 0   | <b>75</b> |
| 76 | SMBUS Value = nits   | 00 | 00000000 | 0   | <b>76</b> |
| 77 | SMBUS Value = nits   | 00 | 00000000 | 0   | <b>77</b> |
| 78 | SMBUS Value = nits   | 00 | 00000000 | 0   | <b>78</b> |
| 79 | Bit[1:0] 00: reserved, 01: single LVDS, 10: dual LVDS, 11: reserved<br>Bit[2] 0: No RTC support, 1: RTC support<br>Bit[7:3] Reserved | 02 | 00000010 | 2   | <b>79</b> |
| 7A | Bit[0] 0: No BIST support, 1: BIST support   | 01 | 00000001 | 1   | <b>7A</b> |



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|    |  |    |          |    |           |
|----|--|----|----------|----|-----------|
|    | Bit[7:1] Reserved  |    |          |    |           |
| 7B | (If <13 char, then terminate with ASCII code 0Ah,<br>set remaining char = 20h) | 0A | 00001010 | 10 | <b>7B</b> |
| 7C | (If <13 char, then terminate with ASCII code 0Ah,<br>set remaining char = 20h) | 20 | 00100000 | 32 | <b>7C</b> |
| 7D | (If <13 char, then terminate with ASCII code 0Ah,<br>set remaining char = 20h) | 20 | 00100000 | 32 | <b>7D</b> |
| 7E | Extension flag (# of optional 128 EDID extension<br>blocks to follow, Typ = 0) | 00 | 00000000 | 0  | <b>7E</b> |
| 7F | Checksum (The 1-byte sum of all 128 bytes in this<br>EDID block shall = 0)     | 2B | 00101011 | 43 | <b>7F</b> |